What is claimed is.

1. A method of alignment, comprising the steps of:

holding a first optical element in opposition to a second optical element for interalignment therewith, said second optical element including a plurality of receivers including a first marginal receiver and a second marginal receiver, said first optical element having a first axis and a second axis, and said second optical element having a third axis and a fourth axis;

detecting a plurality of light signals that pass from said first optical element to said second optical element, said light signals including a first light signal that impinges on said first marginal receiver, and a second light signal that impinges on said second marginal receiver;

in a first phase of operation rotating said first optical element about a Y-axis until said second axis is in a parallel alignment with said fourth axis; and

in a second phase of operation displacing said first optical element along said Y-axis;

while displacing said first optical element along said Y-axis, recording a signal strength of one of said first light signal and said second light signal; and

displacing said first optical element along a Z-axis until said signal strength has an optimal value.

2. The method according to claim 1 and wherein said first axis and said third axis are substantially parallel.

3. The method according to claim 1 and wherein said second axis and said fourth axis are substantially parallel.

4. The method according to claim 1 and wherein said first axis and said second axis are substantially orthogonal.

5. The method according to claim 1 and wherein said third axis and said fourth axis are substantially orthogonal.

6. The method according to claim 1, wherein said step of recording said signal strength further comprises the step of determining a full-width half maximum of said signal strength.

7. The method according to claim 6, wherein said step of recording said signal strength further comprises the step of determining a full-width half maximum squared of said signal strength, wherein said optimal value is a minimum value of said full-width half maximum squared.

8. The method according to claim 1, further comprising the steps of:

in said first phase of operation displacing said first optical element stepwise on an interval of said Z-axis, defining a plurality of incremental positions thereon;

at each of said incremental positions displacing said first optical element on an interval of said Y-axis;

while said step of displacing said first optical element on said interval of said Y-axis is being performed, determining a function of said first light signal and determining said function of said second light signal;

after said step of displacing said first optical element stepwise on said interval of said Z-axis has been performed, determining a first point on said Z-axis where said function of said first light signal has a first optimum value and a second point on said Z-axis where said function of said second light signal has a second optimum value;

calculating a difference ΔZ between said second point and said first point;

responsive to said step of calculating rotating said first optical element about said Y-axis to reduce a distance between said first marginal receiver and said second point.

9. The method according to claim 8, wherein said step of rotating said first optical element about said Y-axis comprises rotation by an angle θ that is given by

$$\theta = \sin^{-1} (\Delta Z/d)$$

where d is a displacement between said first marginal receiver and said second marginal receiver.

10. The method according to claim 8, wherein said function is a full-width half maximum, said first optimum value and said second optimum value are each a minimum value of said function.

11. The method according to claim 1, further comprising the steps of in said second phase of operation:

in a first iteration displacing said first optical element on an interval of said Y-axis;

while said step of displacing said first optical element is being performed in said first iteration, determining a function of at least one of said light signals to define a first determination of said function;

displacing said first optical element on said Z-axis by a first increment;

in a second iteration displacing said first optical element on said interval of said Y-axis;

while said step of displacing said first optical element is being performed in said second iteration, determining

said function to define a second determination of said function; and

responsive to a difference between said first determination and said second determination, displacing said first optical element on said Z-axis by a second increment.

12. The method according to claim 11, wherein said function is a full-width half maximum squared.

13. The method according to claim 11, wherein said step of determining said function comprises determining a sum of said function of a first one of said light signals and said function of a second one of said light signals.

14. The method according to claim 1, further comprising the steps of:

in a first iteration: displacing said first optical element on an interval of said Y-axis;

while said step of displacing said first optical element is being performed in said first iteration, determining a first point on said Y-axis wherein a first signal has a first maximum magnitude, and determining a first magnitude of a second signal at said first point;

rotating said first optical element about said Z-axis by a first increment;

in a second iteration: displacing said first optical element on said interval of said Y-axis;

while said step of displacing said first optical element is being performed in said second iteration, determining a second point on said Y-axis wherein said first light signal has a second maximum magnitude, and determining a second magnitude of said second light signal at said second point;

responsive to a difference between said first magnitude and said second magnitude, rotating said first optical element about said Z-axis by a second increment.

15. A computer software product, comprising a computer-readable medium in which program instructions are stored, said instructions being read by a computer, wherein said computer is connected to an alignment apparatus comprising:

a chuck holding a first optical element thereon, said first optical element opposing a second optical element for interalignment therewith, said second optical element including a plurality of receivers including a first marginal receiver and a second marginal receiver, said first optical element having a first axis and a second axis, said second optical element having a third axis and a fourth axis;

a plurality of detectors, each of said detectors detecting light emitted from said first optical element that impinges on one of said receivers, said detectors comprising a first detector that detects said light impinging on said first marginal receiver, and a second detector that detects said light impinging on said second marginal receiver;

a first actuator for displacing said chuck on a Y-axis, said first actuator being driven by a first motor;

a second actuator for displacing said chuck on a Z-axis, said second actuator being driven by a second motor;

a third actuator for rotating said chuck about said Y-axis, said third actuator being driven by a third motor;

wherein said computer receives a plurality of signals from said detectors, said signals comprising a first signal from said first detector, a second signal from said second detector, said computer transmitting control signals to energize said first motor, said second motor, and said third motor;

wherein said instructions, when read by said computer, cause said computer to perform the steps of:

in a first phase of operation energizing said third motor to rotate said chuck about said Y-axis until said second axis is in a parallel alignment with said fourth axis; and

in a second phase of operation energizing said first motor to displace said chuck along said Y-axis;

while performing said step of energizing said first motor, recording a response of one of said first detector, said second detector; and

energizing said second motor to displace said chuck along said Z-axis until a first function of said response has an optimal value.

16. The method according to claim 15 and wherein said first axis and said third axis are substantially parallel.

17. The method according to claim 15 and wherein said second axis and said fourth axis are substantially parallel.

18. The method according to claim 15 and wherein said first axis and said second axis are substantially orthogonal.

19. The method according to claim 15 and wherein said third axis and said fourth axis are substantially orthogonal.

20. The computer software product according to claim 15, wherein said first function comprises a function of a full-width half maximum of a plot of said response.

21. The computer software product according to claim 20, wherein said first function is a full-width half maximum squared, and said optimal value is a minimum value.

22. The computer software product according to claim 15, wherein in said first phase of operation, said computer performs the steps of:

energizing said second motor to displace said chuck stepwise on an interval of said Z-axis, defining a plurality of incremental positions thereon;

at each of said incremental positions energizing said first motor to displace said chuck on an interval of said Y-axis;

while said step of energizing said first motor is being performed, determining a second function of said first signal and determining said second function of said second signal;

after said step of energizing said second motor has been performed, determining a first point on said Z-axis where said second function of said first signal has a first optimum value and a second point on said Z-axis where said second function of said second signal has a second optimum value;

calculating a difference ΔZ between said second point and said first point;

responsive to said step of calculating energizing said third motor to rotate said chuck about said Y-axis to reduce a distance between said first marginal receiver and said second point.

23. The computer software product according to claim 22, wherein said third motor rotates said chuck about said Y-axis by an angle θ that is given by

$$\theta = \sin^{-1} (\Delta Z/d)$$

where d is a distance between said first marginal receiver and said second marginal receiver.

24. The computer software product according to claim 22, wherein said second function is a full-width half maximum,

said first optimum value and said second optimum value are each a minimum value of said second function.

25. The computer software product according to claim 15, wherein in said second phase of operation said computer performs the steps of:

in a first iteration: energizing said first motor to displace said chuck on an interval of said Y-axis;

while said step of energizing said first motor is being performed in said first iteration, determining a third function of at least one of said signals to define a first determination of said third function;

energizing said second motor to displace said chuck on said Z-axis by a first increment;

in a second iteration: energizing said first motor to displace said chuck on said interval of said Y-axis;

while said step of energizing said first motor is being performed in said second iteration, determining said third function to define a second determination of said third function; and

responsive to a difference between said first determination and said second determination, energizing said second motor to displace said chuck on said Z-axis by a second increment.

26. The computer software product according to claim 25, wherein said third function is a full-width half maximum squared.

27. The computer software product according to claim 25, wherein said step of determining said third function comprises determining a sum of said third function of a first one of said signals and said third function of a second one of said signals.

28. The computer software product according to claim 15, wherein said instructions comprise a Labview program.

29. An alignment apparatus, comprising:

a chuck holding a first optical element thereon, said first optical element opposing a second optical element for interalignment therewith, said second optical element including a plurality of receivers including a first marginal receiver and a second marginal receiver, said first optical element having a first axis, said second optical element having a second axis;

a plurality of detectors, each of said detectors detecting light emitted from said first optical element that impinges on one of said receivers, said detectors comprising a first detector that detects said light impinging on said first marginal receiver, and a second detector that detects said light impinging on said second marginal receiver;

a first actuator for displacing said chuck on a Y-axis, said first actuator being driven by a first motor;

a second actuator for displacing said chuck on a Z-axis, said second actuator being driven by a second motor;

a third actuator for rotating said chuck about said Y-axis, said third actuator being driven by a third motor;

a computer, receiving a plurality of signals from said detectors, said signals comprising a first signal from said first detector, a second signal from said second detector, said computer transmitting control signals to energize said first motor, said second motor, and said third motor, computer program instructions being stored in said computer, which instructions, when read by said computer, cause said computer to perform the steps of:

in a first phase of operation energizing said third motor to rotate said chuck about said Y-axis until said first axis is in a parallel alignment with said second axis; and

in a second phase of operation energizing said first motor to displace said chuck along said Y-axis;

while performing said step of energizing said first motor, recording a response of one of said first detector, said second detector; and

energizing said second motor to displace said chuck along said Z-axis until a first function of said response has an optimal value.

30. The method according to claim 29 and wherein said first axis and said third axis are substantially parallel.

31. The method according to claim 29 and wherein said second axis and said fourth axis are substantially parallel.

32. The method according to claim 29 and wherein said first axis and said second axis are substantially orthogonal.

33. The method according to claim 29 and wherein said third axis and said fourth axis are substantially orthogonal.

34. The alignment apparatus according to claim 29, wherein said first function comprises a function of a full-width half maximum of a plot of said response.

35. The alignment apparatus according to claim 34, wherein said first function is a full-width half maximum squared, and said optimal value is a minimum value.

36. The alignment apparatus according to claim 29, wherein in said first phase of operation, said computer performs the steps of:

energizing said second motor to displace said chuck stepwise on an interval of said Z-axis, defining a plurality of

incremental positions thereon;

at each of said incremental positions energizing said first motor to displace said chuck on an interval of said Y-axis;

while said step of energizing said first motor is being performed, determining a second function of said first signal and determining said second function of said second signal;

after said step of energizing said second motor has been performed, determining a first point on said Z-axis where said second function of said first signal has a first optimum value and a second point on said Z-axis where said second function of said second signal has a second optimum value;

calculating a difference ΔZ between said second point and said first point;

responsive to said step of calculating energizing said third motor to rotate said chuck about said Y-axis to reduce a distance between said first marginal receiver and said second point.

37. The alignment apparatus according to claim 36, wherein said third motor rotates said chuck about said Y-axis by an angle θ that is given by

$$\theta = \sin^{-1} (\Delta Z/d)$$

where d is a distance between said first marginal receiver and said second marginal receiver.

38. The alignment apparatus according to claim 36, wherein said second function is a full-width half maximum, said first optimum value and said second optimum value are each a minimum value of said second function.

39. The alignment apparatus according to claim 29, wherein in said second phase of operation said computer performs the steps of:

in a first iteration: energizing said first motor to displace said chuck on an interval of said Y-axis;

while said step of energizing said first motor is being performed in said first iteration, determining a third function of at least one of said signals to define a first determination of said third function;

energizing said second motor to displace said chuck on said Z-axis by a first increment;

in a second iteration: energizing said first motor to displace said chuck on said interval of said Y-axis;

while said step of energizing said first motor is being performed in said second iteration, determining said third function to define a second determination of said third function; and

responsive to a difference between said first determination and said second determination, energizing said second motor to displace said chuck on said Z-axis by a second increment.

40. The alignment apparatus according to claim 39, wherein said third function is a full-width half maximum squared.

41. The alignment apparatus according to claim 39, wherein said step of determining said third function comprises determining a sum of said third function of a first one of said signals and said third function of a second one of said signals.

42. An alignment apparatus, comprising:

a chuck holding a first optical element thereon, said first optical element opposing a second optical element for

interalignment therewith, said second optical element being carried on a substrate, said second optical element including a plurality of receivers including a first marginal receiver and a second marginal receiver, said first optical element having a first axis and a second axis, said second optical element having a third axis and a fourth axis;

a first actuator for displacing said chuck on a Y-axis, said first actuator being driven by a first motor;

a second actuator for displacing said chuck on a Z-axis, said second actuator being driven by a second motor;

a third actuator for rotating said chuck about said Y-axis, said third actuator being driven by a third motor;

a fourth actuator for rotating said chuck about said Z-axis, said fourth actuator being driven by a fourth motor;

a third optical element, directing a beam along said Z-axis in a light path that extends between a light source and said second optical element via said first optical element;

a plurality of detectors, each of said detectors detecting said beam impinging on one of said receivers, said detectors comprising a first detector that detects said beam impinging on said first marginal receiver, and a second detector that detects said beam impinging on said second marginal receiver;

a computer, receiving a plurality of signals from said detectors, said signals comprising a first signal from said first detector, a second signal from said second detector, said computer transmitting control signals to energize said first motor, said second motor, said third motor, and said fourth motor, computer program instructions being stored in said computer, which instructions, when read by said computer, cause said computer to perform the steps of:

in a first phase of operation energizing said third motor to rotate said chuck about said Y-axis until said second axis is in parallel alignment with said fourth axis;

in a second phase of operation energizing said first motor to displace said chuck along said Y-axis;

while performing said step of energizing said first motor, recording a response of one of said first detector, said second detector; and

energizing said second motor to displace said chuck along said Z-axis until a first function of said response has an optimal value; and

in a third phase of operation energizing said fourth motor to rotate said chuck about said Z-axis until said first signal and said second signal are equalized.

43. The method according to claim 42 and wherein said first axis and said third axis are substantially parallel.

44. The method according to claim 42 and wherein said second axis and said fourth axis are substantially parallel.

45. The method according to claim 42 and wherein said first axis and said second axis are substantially orthogonal.

46. The method according to claim 42 and wherein said third axis and said fourth axis are substantially orthogonal.

47. The alignment apparatus according to claim 42, wherein said chuck has a channel formed therein, a vacuum in said channel urging said first optical element against said chuck.

48. The alignment apparatus according to claim 42, wherein said first function is a full-width half maximum squared, and said optimal value is a minimum value.

49. The alignment apparatus according to claim 42, wherein in said first phase of operation, said computer performs the steps of:

energizing said second motor to displace said chuck stepwise on an interval of said Z-axis, defining a plurality of incremental positions thereon;

at each of said incremental positions energizing said first motor to displace said chuck on an interval of said Y-axis;

while said step of energizing said first motor is being performed, determining a second function of said first signal and determining said second function of said second signal;

after said step of energizing said second motor has been performed, determining a first point on said Z-axis where said second function of said first signal has a first optimum value and a second point on said Z-axis where said second function of said second signal has a second optimum value;

calculating a difference ΔZ between said second point and said first point;

responsive to said step of calculating energizing said third motor to rotate said chuck about said Y-axis by an angle θ that is given by

$$\theta = \sin^{-1} (\Delta Z/d)$$

where d is a distance between said first marginal receiver and said second marginal receiver.

50. The alignment apparatus according to claim 49, wherein said second function is a full-width half maximum, said first optimum value and said second optimum value are each a

minimum value of said second function.

51. The alignment apparatus according to claim 42, wherein in said second phase of operation said computer performs the steps of:

in a first iteration: energizing said first motor to displace said chuck on an interval of said Y-axis;

while said step of energizing said first motor is being performed in said first iteration, determining a third function of at least one of said signals to define a first determination of said third function;

energizing said second motor to displace said chuck on said Z-axis by a first increment;

in a second iteration: energizing said first motor to displace said chuck on said interval of said Y-axis;

while said step of energizing said first motor is being performed in said second iteration, determining said third function to define a second determination of said third function; and

responsive to a difference between said first determination and said second determination, energizing said second motor to displace said chuck on said Z-axis by a second increment.

52. The alignment apparatus according to claim 51, wherein said third function is a full-width half maximum squared.

53. The alignment apparatus according to claim 51, wherein said step of determining said third function comprises determining a sum of said third function of a first one of said signals and said third function of a second one of said signals.

54. The alignment apparatus according to claim 42, wherein in said third phase of operation said computer performs the steps of:

in a first iteration: energizing said first motor to displace said chuck on an interval of said Y-axis;

while said step of energizing said first motor is being performed in said first iteration, determining a first point on said Y-axis wherein said first signal has a first maximum magnitude, and determining a first magnitude of said second signal at said first point;

energizing said fourth motor to rotate said chuck about said Z-axis by a first increment;

in a second iteration: energizing said first motor to displace said chuck on said interval of said Y-axis;

while said step of energizing said first motor is being performed in said second iteration, determining a second point on said Y-axis wherein said first signal has a second maximum magnitude, and determining a second magnitude of said second signal at said second point;

responsive to a difference between said first magnitude and said second magnitude, energizing said fourth motor to rotate said chuck about said Z-axis by a second increment.